



Chemistry

Nature of the Subject

The IB Chemistry course introduces students into concepts that explain matter at the microscopic level, which then allow predictions on matter's behavior at a macroscopic level. During the course, students are expected to gain an in depth understanding of the main principles and advances in the area of Chemistry, seek for patterns, understand the mathematical laws that explain chemical changes, develop their investigative skills and communicate their ideas in a coherent and scientific context. The aim of the course is to integrate concepts, topic content and inquiry about matter. There are two main themes, **Structure and Reactivity**, around which this syllabus is constructed, based on the principle that structure determines reactivity, which in turn transforms structure. Subtopics include modeling, bonding and classification of matter, energy rates and mechanisms of chemical changes. Apart from the in-depth conceptual understanding, students are also expected to show awareness on the limitations of the experimental methodology, suggest solutions and reflect on connections between science and community.

Distinction between Higher and Standard Level:

Students at both SL and HL will gain a fundamental understanding of science through an experimental and concept based programme, be exposed to the concept of nature of science as central theme and complete a piece of internally assessed work (the individual scientific investigation) and the collaborative sciences project

The SL course has a recommended 150 teaching hours, compared to 240 hours for the HL course. The distinction between SL and HL lies on both breadth and depth. HL students are expected to gain a more in depth knowledge and understanding of the subject, use additional mathematical skills, and make more connections between different areas of the syllabus.

Syllabus outline

The following topics will be covered in both SL and HL classes, some topics will only be discussed at Higher Level or they will be discussed in more depth.

Topics will be introduced through conceptual understanding and guiding questions will be discussed in the beginning and revisited in the end of each topic.

- Structure 1. Models of the particulate nature of matter
- Structure 2. Models of bonding and structure
- Structure 3. Classification of matter
- Reactivity 1. What drives chemical reactions?
- Reactivity 2. How much, how fast and how far?
- Reactivity 3. What are the mechanisms of chemical change?

Prior Learning

Students should be able to study chemistry at SL with no background in science. Considering the study of the subject at HL, students who have undertaken the IB Middle Years Programme (MYP) or studied a science course before would be better prepared.

Assessment Objectives

Having followed the Diploma Programme course in Chemistry students will be expected to:

1. Demonstrate knowledge of:
 - a. terminology, facts and concepts
 - b. skills, techniques and methodologies.
2. Understand and apply knowledge of:
 - a. terminology and concepts
 - b. skills, techniques and methodologies.
3. Analyse, evaluate, and synthesize:
 - a. experimental procedures
 - b. primary and secondary data
 - c. trends, patterns and predictions.
4. Demonstrate the application of skills necessary to carry out insightful and ethical investigations.

Teaching Approach

Teaching IB Chemistry aims to create and facilitate learning experiences through which students will be engaged in **structured inquiry**, develop **critical and creative thinking**, and the **IB Learner** attributes. Inquiry-based learning is being promoted by introduction of guiding questions, experimental investigations, class presentations, and collaborative project(s). Opportunities for students to develop/apply critical and thinking skills will be provided through the interpretation and analysis of their own data, evaluating scientific sources and testing methodologies/hypotheses from data based questions. Links to Theory of Knowledge and Nature of Science will also be introduced in several parts of the syllabus. These links will allow students to deepen their understanding, make connections with other disciplines and work with real life examples.

Why students might choose this subject

The study of IB Chemistry is essential for a wide range of academic fields including medicine, engineering, STEM and environmental science. Through the course, students gain a deep understanding of the fundamentals of Chemistry (some of the material covered during the first year at University), develop analytical and critical skills, be exposed to global scientific perspectives and make connections between disciplines. They will also develop practical skills and be exposed to laboratory techniques. It is a course suitable for highly motivated students with many benefits in their University and future academic career.

Course Assessment

Formative assessment in order to monitor the students' progress include class discussions, presentations and activities, homework and group work, while summative assessment is performed through quizzes, revision tests and lab reports. All parts of students work are assessed against criteria specified by the IB. During the IB2 year, the first IA draft and the final IA copy are considered as a summative assessment.

The final Diploma grade in the subject is determined by two assessment components:

Internal assessment: Scientific investigation

This component is internally assessed by the subject teacher and externally moderated by the IBO. The grade awarded comprises 20% of the final IB Diploma grade.

The **scientific investigation** is an investigation performed by the student on a topic covered by the course material. The outcome of the investigation will be presented in the form of a written scientific report. The assessment of the investigation will be based on 4 criteria including personal research design, data analysis, conclusion and evaluation. The overall word count of the report should not exceed 3000 words.

External assessment: Written examinations

The final written examination takes place in May of the second year and comprises 80% of the final IB Diploma grade. It is externally assessed by the IBO.

It consists of 2 papers:

Paper 1:

Paper 1A consists of multiple-choice questions testing core topics for SL students and both core and AHL topics for HL students.

Paper 1B has four data-based questions related to experimental work and the syllabus.

Paper 2:

Section A: a data-base question and short-answer questions

Section B: one extended response question from a choice of two at SL level and two extended response questions from a choice of three at HL level on the same material as Paper 1.